State of Iowa

BUREAU OF LABOR

East Seventh and Court

Des Moines, Iowa 50319

SAFETY RULES

FOR

BOILERS

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Governor

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Labor Commissioner

STATE OF IOWA

BUREAU OF LABOR

FOREWORD

This rule establishes minimum Safety Standards for the protection of workers and others in places of employment from accidents so that places of employment shall be rendered safe and accidents shall be prevented.

This rule is promulgated by the Iowa Bureau of Labor and under the authority of Section 89.4(1) of the 1966 Code of Iowa.

It became effective with the force and effect of law on July 4, 1959.

INDEX

SAFETY RULES FOR BOILERS

State of Iowa Construction Code is used to designate the accepted reference for construction, installation, operation, and inspection of boilers and unfired pressure vessels and should hereafter be referred to as the Iowa Boiler Code.

The A. S. M. E. Boiler Code and amendments and interpretations thereto are hereby adopted and shall hereafter be known as the "Iowa Construction Code" (Iowa Code). A copy of this Code is on file in the office of the Commissioner of Labor, and in the state law library in the statehouse.

Power boiler as used herein shall mean any vessel used for generating steam or vapor for power or heating purposes at a pressure in excess of 15 lbs. per square inch.

Unfired pressure vessel as used herein shall mean any tank, jacketed vessel or other unfired pressure vessel used for transmitting steam for power or for using or storing steam under pressure for heating or steaming purposes at a pressure in excess of 15 lbs. pressure except those vessels definitely excluded by paragraph U-1 of the Iowa Code.

Chief inspector as used herein shall mean the state boiler inspector appointed by the Commissioner of Labor under the provisions of section 1 of Act 174 [ch 97, Acts 49 G. A.; ch 89, C. '50].

Deputy inspector as used herein shall mean any deputy inspector of boilers appointed by the Commissioner of Labor under the provisions of section 1 of Act 174 [ch 97, Acts 49 G. A.; ch 89, C. '50].

Special inspector as used herein shall mean an inspector employed by an insurance company, which is authorized to insure boilers in the state of Iowa, and who shall have been commissioned by the Commissioner of Labor. Such inspectors shall be commissioned by the Commissioner of Labor provided they hold a commission from a state having a boiler law the equivalent of that of the state of Iowa or a commission from the National Board of Boiler and Pressure Vessel Inspectors.

Inspector as used herein shall mean the chief inspector, a deputy inspector, or a special inspector.

Department as used herein shall mean the Bureau of Labor of the state of Iowa.

Commissioner as used herein shall mean the Commissioner of Labor.

The term secondhand boiler or secondhand pressure vessel is a boiler or pressure vessel of which both the location and ownership have been changed.

Owner or user as used herein shall mean any person, firm, or corporation owning or operating or in charge of or in control of any boiler or unfired pressure vessel within this state.

Existing installation as used herein shall be taken to mean and to apply to any boiler or unfired pressure vessel which was installed or within this state ready to be installed or has previously operated in this state prior to the effective date of these rules.

SECTION 1. NEW INSTALLATIONS—POWER BOILERS

No power boiler shall hereafter be brought into this state and installed unless it has been constructed and inspected in accordance with the requirements of the Iowa Code for Boilers and is so stamped or is inspected and stamped in accordance with the requirements of the National Board of Boiler and Pressure Vessel Inspectors. A boiler having a standard stamping of a state that has adopted a standard of construction equivalent to the standard of the state of Iowa may be accepted by the department provided, however, that the person desiring to install same shall make application for the installation of same and shall file with the application a manufacturer's data report covering the construction of the boiler in question.

Upon completion of installation, all such boilers shall be inspected by the chief inspector, a deputy inspector or a special inspector commissioned to inspect boilers in this state and at least once each year thereafter shall be subjected to a regular internal and external inspection.

Also at time of first inspection after installation all said boilers must be stamped with a serial number of the state of Iowa followed by the letters Ia., said letters and figures to be not less than 5/16 inch in height.

SECTION 2. EXISTING INSTALLATIONS—POWER BOILERS

Rule 1. The maximum allowable working pressure on the shell of a power boiler or drum shall be determined by the strength of the weakest *section of the structure*, computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint, *or tube ligaments*, the inside diameter of the course and the factor of safety allowed by these rules $\frac{TS \times t \times E}{R \times FS}$ = maximum allowable working pressure in pounds per square inch.

Where:

TS = ultimate tensile strength of shell plates, lbs. per square inch.

t = minimum thickness of shell plate, in weakest course in inches.

E = efficiency of longitudinal joint.

For riveted construction, determined by rules given in paragraph P-181, of Iowa Code.

For fusion welded construction, determined by rules in paragraph P-102, of Iowa Code, or Rule 2.

For tube ligaments, determined by rules in paragraphs P-192 and P-193, of Iowa Code.

For seamless construction, shall be considered 100%.

Rule 2. Factors of Safety. (a) The lowest factor of safety permissible on existing installations shall be 4, excepting for horizontal tubular boilers having continuous lap seams more than twelve (12) feet in length where the factor of safety shall be 8, and when this type of boiler is removed from its existing setting, it shall not be reinstalled for pressure in excess of 15 pounds.

(b) Boilers which are reinstalled shall have a minimum factor of safety of 6 when the longitudinal seams are of lap riveted construction, and a minimum factor of safety of 5 when the longitudinal seams are of butt and double strap construction.

(c) A boiler constructed with fusion welded seams which are not x-rayed and stress relieved during construction shall have at least three (3) one-inch diameter plugs trepanned from each seam and these plugs etched to determine the soundness of the weld. If this tests discloses the weld to be sound through 80% of the thickness of the plate the boiler may be operated at a pressure based upon the formula in rule 1, using an efficiency of longitudinal joint of 80% and a factor of safety of not less than seven (7). If the weld is not sound through 80% of the thickness of plate the boiler shall not be operated at a pressure in excess of 15 pounds.

A boiler with fusion welded seams that have been x-rayed and stress relieved may be operated at a pressure based upon the formula in rule 1, using an efficiency of longitudinal joint 80% and a factor of safety of five (5).

(d) The above factors of safety shall be increased by the inspector if the condition and safety of the boilers demand it.

(e) In no case shall the maximum working pressure of an old boiler be increased to a greater pressure than would be allowed for a new boiler of same construction.

Rule 3. Cast Iron Headers and Mud Drums.

(a) The maximum allowable working pressure on a water tube boiler, the tubes of which are secured to cast iron or malleable iron headers, or which have cast iron mud drums, shall not exceed 160 pounds per square inch.

(b) The maximum steam pressure on any boiler in which steam is generated, if constructed of cast iron, shall be fifteen pounds per square inch.

Rule 4. Tensile Strength. When the tensile strength of steel or wrought iron shell plates is not known, it shall be taken as 55,000 lbs. per square inch for steel and 45,000 lbs. per square inch for wrought iron.

Rule 5. Strength of Rivets in Shear. In computing the ultimate strength of rivets in shear the cross sectional area of the rivet shank shall be used, for the values in pounds per square inch, based upon the requirements of paragraphs P-16 of Iowa Code.

Rule 6. Crushing Strength of Mild Steel. The resistance to crushing of mild steel shall be taken at 95,000 lbs. per square inch of cross sectional area.

Rule 7. Rivets. When the diameter of the rivet holes in the longitudinal joints of a boiler is not known, the diameter and cross sectional area of rivets, after driving, may be selected from the following table or ascertained by cutting out one rivet in the body of the joint.

Thickness of plate	1/4"	9/32"	5/16"	11/32"
Diameter of rivet after driving	11/16"	11/16"	3/4"	3/4"
Thickness of plate	3/8"	13/32"	7/16"	15/32"
Diameter of rivet after driving	13/16"	13/16"	15/16"	15/16"
Thickness of plate	1/2"	9/16"	5/8"	
Diameter of rivet after driving	15/16"	1 1/16"	1 1/16"	

Rule 8. (a) Each boiler shall be equipped with one or more safety valves placed as close to the boiler as possible. No valve of any description shall be placed between the safety valve and the boiler nor on the escape pipe between the safety valve and the atmosphere. When an elbow is placed on a safety valve escape pipe, it shall be located close to the safety valve outlet or the escape pipe shall be securely anchored and supported. When an escape pipe is used, it shall be full sized and fitted with an open drain to prevent water lodging in the upper part of the safety valve or escape pipe. Safety valves having either the seat or disc of cast iron shall not be used. Dead weight safety valves are prohibited for pressure exceeding 15 lbs. Lever weighted safety valves, when in need of repair, must be replaced with spring loaded safety valves.

(b) The safety valve capacity of each boiler shall be such that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than 6 percent above the maximum allowable working pressure, or more than 6 percent above the highest pressure to which any valve is set.

Rule 9. One or more safety valves on every boiler shall be set at or below the maximum allowable working pressure. The remaining valves may be set within a range of 3 percent above the maximum allowable working pressure, but the range of setting of all the safety valves on a boiler shall not exceed 10 percent of the highest pressure to which any valve is set.

Rule 10. Fire-actuated fusible plugs, when used, shall conform to the rules and regulations of the Iowa Code for new construction.

Rule 11. In all cases where no mechanical feed is attached to a boiler, the safety valve shall be set at not less than 6 percent below the pressure of the main source of supply feeding the boiler. A return trap shall not be considered as a mechanical feeding device. Not less than two means shall be provided for feeding the boiler against the maximum approved pressure.

In all cases where the source of feed water is such that the pressure will not feed the boiler, approved feed pumps, injectors or inspirators shall be provided to give ample feed against the maximum approved pressure. Feed water should have a temperature of not less than 120 degrees Fahrenheit.

Rule 12. Water Glasses. Each steam boiler shall have at least one water glass, the lowest visible part of which shall be not less than 3 inches above the lowest permissible water level.

Rule 13. Each boiler shall have three or more gage cocks, located within the range of the visible length of the water glass, when the maximum allowable working pressure exceeds 15 lbs. per square inch except when such boiler has two water glasses with independent connections to the boiler, located on the same horizontal line and not less than 2 feet apart.

Rule 14. No outlet connections, except for damper regulator, feed water regulator, low water fuel cut-out, drains or steam gages, shall be placed on the pipes connecting a water column to a boiler.

Rule 15. Steam Gages. Each steam boiler shall have a steam gage connected to the steam space or to the steam connection to the water column. The steam gage shall be connected to a siphon or equivalent device of sufficient capacity to keep the gage tube filled with water and so arranged that the gage cannot be shut off from the boiler except by a cock placed near the gage and provided with a tee or lever handle arranged to be parallel to the pipe in which it is located when the cock is open.

Rule 16. Stop Valve. Each steam outlet from a boiler (except safety valve connections) shall be fitted with a stop valve located as close as practicable to the boiler.

Rule 17. When a stop valve is so located that water can accumulate, ample drains shall be provided.

Rule 18. Bottom Blow-off Pipes. Each boiler shall have a blow-off pipe fitted with valve or cock in direct connection with the lowest water space practicable. When cocks are used they shall be of the gland or guard type and suitable for the pressure allowed. Globe valves are not permitted.

Rule 19. When the maximum allowable working pressure exceeds 100 lbs. per square inch, the blow-off pipe shall be extra heavy from boiler to valve or valves, and shall run full size without reducers or bushings. Blow-off piping shall be of black wrought iron or black steel (not galvanized) and shall be extra heavy pipe size. (a) All fittings between the boiler and valve shall be of steel or extra heavy fittings or bronze, brass or malleable iron. In case of renewal of pipe or fittings in the blow-off lines, as specified in this paragraph, they shall be installed in accordance with the rules for new installations.

Rule 20. When the maximum allowable working pressure exceeds 100 lbs. per square inch, each bottom blow-off pipe shall be fitted with two valves or a valve and cock, such valves and cocks to be of extra heavy type.

Rule 21. A bottom blow-off pipe, when exposed to direct furnace heat, shall be protected by fire-brick or other heat-resisting material, so arranged that the pipe may be inspected.

Rule 22. An opening in the boiler setting for a blow-off pipe shall be arranged to provide for free expansion and contraction.

Rule 23. Feed Piping. The feed pipe of a steam boiler shall be provided with a check valve near the boiler and a valve or cock between the check valve and the boiler, and when two or more boilers are fed from a common source, there shall also be a globe valve on the branch to each boiler, between the check valve and the source of supply. When a globe valve is used on a feed pipe, the inlet shall be under the disc of the valve.

Rule 24. Test Pressure. When a hydrostatic test is applied, test pressure shall be not more than 1½ times the maximum allowable working pressure.

(a) During a hydrostatic test of a boiler, suitable provisions shall be made so that it will not be necessary to screw down the compression screw upon the spring of the safety valve. The temperature of water used during a hydrostatic test shall not exceed 160 degrees Fahrenheit.

Rule 25. In any case where repairs are made or fittings or appliances renewed they must comply with the Iowa Code for new installations.

Rule 26. All existing installed boilers shall be stamped with an Iowa serial number provided for new installations.

Rule 27. In any condition not definitely covered by these rules the Iowa Code for new installations shall apply.

SECTION 3. NEW INSTALLATIONS—MINIATURE BOILERS

No miniature boiler shall hereafter be brought into this state and installed unless it has been constructed and inspected in accordance with the requirements of the Iowa Code for miniature boilers and is so stamped or is inspected and stamped in accordance with the requirements of the National Board of Boiler and Pressure Vessel Inspectors. A boiler having a standard stamping of a state that has adopted a standard of construction equivalent to the standard of the state of Iowa may be accepted by the department provided, however, that the person desiring to install same shall make application for the installation of same and shall file with the application a manufacturer's data report covering the construction of the boiler in question.

Upon completion of installation all such boilers shall be inspected by the chief inspector, a deputy inspector or a special inspector commissioned to inspect boilers in this state and at least once each year thereafter shall be

subjected to a regular internal and external inspection.

Also at time of first inspection after installation all said boilers must be stamped with the serial number of the state of Iowa, followed by the letters Ia., said letters and figures to be not less than 5/16 inch in height.

SECTION 4. EXISTING INSTALLATIONS—MINIATURE BOILERS

Rules and regulations as adopted for power boilers (section 2) as applied to strength of material, mathematical calculations to determine the safety of a boiler shall be used in all computations pertaining to the safe working pressure of a miniature boiler unless a special rule is hereafter given.

Rule 1. The maximum allowable working pressure on the shell of a boiler or drum shall be determined by rule 1, section 2, for power boilers. $\frac{TS \times t \times E}{R \times FS}$ = maximum allowable working pressure, pounds per square inch.

Where:

TS = ultimate tensile strength of shell plates, lbs. per square inch.

t = minimum thickness of shell plate, in weakest course, in inches.

E = efficiency of longitudinal point, method of determining which is given in paragraph P-181, of the Iowa Code.

E = for tube ligaments between openings shall be calculated by the rules given in P-192 and P-193, Iowa Code.

R = inside radius of the weakest course of the shell or drum in inches.

FS = factor of safety allowed by these rules.

Note: To be used as given above for longitudinal joints, riveted construction or if for fusion welded joints, E shall be taken as per efficiency specified in paragraph P-102, of the Iowa Code.

In any case wherein there are both riveted joints and tube ligaments to consider, the weaker of these shall be used for E.

Rule 2. The construction of miniature boilers including factor of safety, except where otherwise specified, shall conform to that required for power boilers (section 2).

Rule 3. The temperature of the heating element for electrically heated steam boilers (closed system) shall be so controlled that it will not exceed 1200 degrees Fahrenheit. All electrical equipment shall be installed and grounded in accordance with the requirements of the National Electrical Safety Code.

Rule 4. Every miniature boiler shall be fitted with suitable washout plugs of 1 inch iron pipe size, which shall be screwed into openings in the shell near the bottom. In miniature boilers of the closed-system type heated by removable internal electrical heating elements, the opening for these elements when suitable for cleaning purposes, may be sub-

stituted for washout openings. All threaded openings in the boiler shall be provided with a riveted or welded reinforcement if necessary to give four full threads therein.

Rule 5. Every miniature boiler shall be provided with at least one feed pump or other feeding device, except where it is connected to a water main carrying sufficient pressure to feed the boiler, or where the steam generator is operated with no extraction of steam (closed system)..

In the latter case in lieu of a feeding device, a suitable connection or opening shall be provided to fill the generator when cold. Such connection shall be not less than ½ inch pipe size.

In all cases where no mechanical feed is attached to a boiler the safety valve shall be set at not less than 6 percent below the pressure of the main source of supply feeding the boiler. A return trap shall not be considered as a mechanical feeding device.

Rule 6. Each miniature boiler shall be fitted with feed water and blow-off connections, which shall not be less than ½ inch iron-pipe size unless operated on a closed system as provided in rule 5. The feed pipe shall be provided with a check valve and a stop valve. The feed water may be delivered to the boiler through the blow-off connection, if desired. The blow-off shall be fitted with a valve or cock in direct connection with the lowest water space practicable.

Rule 7. Each miniature boiler for operation with a definite water level shall be equipped with a glass water gage for determining the water level. The lowest permissible water level shall be at a point one-third of the height of the shell, except where the boiler is equipped with internal furnace, when it shall be not less than one-third of the length of the tubes above the top of the furnace. In the case of small generating units operated on the closed system where there is insufficient space for the usual glass water gage, water level indicators of the glass bull's-eye type may be used.

Rule 8. Each miniature boiler shall be equipped with a steam gage having its dial graduated to not less than 1½ times the maximum allowable working pressure. The gage shall be connected to the steam space or to the steam connection to the water column by a brass or bronze composition siphon tube, or equivalent device that will keep the gage tube filled with water.

Rule 9. Each miniature boiler shall be equipped with a sealed spring-loaded pop safety valve, not less than ½ inch in diameter, connected directly to the boiler. Where there is no extraction of steam (closed system) a fracturing disk safety valve may be used in addition to the spring-loaded pop safety valve. The safety valve shall be plainly marked by

the manufacturer with a name or an identifying trade-mark, the nominal diameter, and the steam pressure at which it is not to blow. The safety valve capacity of each boiler shall be such that the safety valve or valves will discharge all the steam that can be generated by the boiler without allowing the pressure to rise more than 6 percent above the maximum allowable working pressure, or more than 6 percent above the highest pressure to which any valve is set.

Rule 10. Each steam line from a miniature boiler shall be provided with a stop valve located as close to the boiler shell or drum as is practicable, except when the boiler and steam receiver are operated as closed system.

Rule 11. Where miniature boilers are gas-fired, the burners used shall conform to the requirements of the American Gas Association, as given in par. MA-5 of the Appendix of the Iowa Code. The burners shall in such cases be equipped with a fuel-regulating governor, which shall be automatic and regulated by the steam pressure. This governor shall be so constructed that in the event of its failure, there can be no possibility of steam from the boiler entering the gas chamber or supply pipe.

SECTION 5. NEW INSTALLATIONS—UNFIRED PRESSURE VESSELS

No unfired pressure vessel shall hereafter be brought into this state and installed unless it has been constructed and inspected in accordance with the requirements of the Iowa Code for unfired pressure vessels and is so stamped or is inspected and stamped in accordance with the requirements of the National Board of Boiler and Pressure Vessel Inspectors. An unfired pressure vessel having a standard stamping of a state that has adopted a standard of construction equivalent to the standards of the state of Iowa may be accepted by the department provided, however, that the person desiring to install same shall make application for the installation of same and shall file with the application the manufacturer's data report covering the construction of the unfired pressure vessel in question.

Upon completion of installation all such unfired pressure vessels shall be inspected by the chief inspector, a deputy inspector, or a special inspector commissioned to inspect boilers in this state, and at least once each year thereafter shall be subjected to a regular internal and external inspection.

Also at time of first inspection after installation all said unfired pressure vessels must be stamped with the serial number of the state of Iowa, followed by the letters Ia., said letters and figures to be not less than 5/16 inch in height.

SECTION 6. EXISTING INSTALLATIONS—UNFIRED PRESSURE VESSELS

Rule 1. The maximum allowable working pressure of the shell of an unfired pressure vessel shall be determined in accordance with

rule 1 of section 2 applying to power boilers except that E for fusion welded joints shall equal:

Single butt welds	50%
Double butt welds	70%
Single lap welds	30%
Double lap welds	60%
Forged welds	80%
Lap brazed joints in steel or copper	90%

Rule 2. Factors of Safety. The lowest factor of safety permissible on existing installations shall be 4, except that this factor of safety shall be increased by the inspector if the condition and safety of the unfired pressure vessel demands it. In no case shall the maximum working pressure of an old unfired pressure vessel be increased to a greater pressure than would be allowed for a new vessel of the same construction.

Rule 3. Lap Seam Cracking. The shell and drum of a pressure vessel in which a lap seam crack is discovered along a longitudinal riveted joint, either butt or lap construction, shall be immediately discontinued from use.

Rule 4. Tensile Strength. Rule 4 of section 2 for power boilers shall apply.

Rule 5. Strength of Rivets in Shear. Rule 5 of section 2 for power boilers shall apply.

Rule 6. Crushing Strength of Mild Steel. Rule 6 of section 2 of power boilers shall apply.

Rule 7. Rivets. Rule 7 of section 2 for power boilers shall apply.

Rule 8. Safety Appliances. All pressure vessels shall be provided with such safety and relief valves and indicating and controlling devices as will insure their safe operation. These devices shall be so constructed, located and installed that they cannot readily be rendered inoperative. The relieving capacity of a safety valve shall be such as to prevent a rise of pressure in the vessel of more than 10 percent above the maximum allowable working pressure, taking into account the effect of static head. The safety valve discharges shall be carried to a safe place. Safety valves shall be of the direct spring loaded type, designed with substantial lifting device so that disc can be lifted from its seat by the spindle not less than one-eighth the diameter of the valve when the pressure of the vessel is 75 percent of that at which the safety valve is set to blow. Safety valves having either the seat or disc of cast iron shall not be used. In a vessel in which pressure is derived from an outside source, each safety valve should be so connected to the vessel, vessels or system which it protects as to prevent a rise of pressure beyond the maximum allowable pressure in any vessel protected by the safety valve. Safety valve springs shall not be adjusted to carry more than 10 per cent greater pressure than that for which the springs are made.

Rule 9. Fusion Welding. Any repairs by fusion welding must be approved beforehand by a commission inspector and all welded repairs must be made in accordance with the rules recommended by the National Board of Boiler and Pressure Vessel Inspectors.

Rule 10. In any condition not covered by the above rules, the rules for new installations of the Iowa Code shall apply.

SECTION 7. GENERAL RULES—POWER BOILERS AND UNFIRED PRESSURE VESSELS

Rule 1. All power boilers and unfired pressure vessels which are subject to regular inspections as provided in Act 174 [ch 97, Acts 49 G.A.; ch 89, C.'50] shall be prepared for inspection when the owners or users are notified by either the chief inspector, a deputy inspector or a special inspector to prepare for such inspections and for hydrostatic test if necessary.

Rule 2. The owner or user of a power boiler or unfired pressure vessel herein required to be inspected, shall, on a date specified by the chief inspector, a deputy inspector, or a special inspector, which date shall be not less than seven days after date of such notice, unless by consent of the owner, prepare the power boiler, heating boiler, or unfired pressure vessel for internal inspection, or hydrostatic pressure test when necessary.

Rule 3. To prepare a power boiler for internal inspection, the water shall be drawn off and the boiler thoroughly washed. All man-hole and hand-hole plates and washout plugs in boilers and water column connections shall be removed, and the furnace and combustion chambers thoroughly cooled and cleaned. All grates of internally fired boilers shall be removed; also enough of the brick work of any type of boiler shall be removed to determine the condition of the boiler, furnace, or other parts at each annual inspection when deemed necessary by the inspector. The steam gage shall be removed for testing.

An unfired pressure vessel shall be prepared for a general inspection to the extent deemed necessary by the inspector.

Rule 4. If a power boiler or an unfired pressure vessel has not been properly prepared for inspection as provided in rule 3, the inspector may decline to make such inspection and the certificate of inspection shall be withheld until the boiler has been properly prepared and inspected.

If it is found that steam or hot water is leaking into a boiler or unfired pressure vessel the source of such leakage shall be disconnected if necessary to cut out such steam or hot water from the boiler or pressure vessel to be inspected.

Rule 5. The fees for inspection and for inspection certificate shall be paid to the Bureau of Labor before a certificate of inspection shall be issued. If the owner or user of any boiler

or unfired pressure vessel required to be inspected under this Act by the department refuses to allow a boiler or unfired pressure vessel to be inspected or refuses to pay the fee as provided for in section 7 of Act 174 [ch 97, Acts 49 G.A.; ch 89, C.'50], then such boiler or unfired pressure vessel shall not be operated until after a valid inspection has been made by either the chief inspector or any deputy inspector or any special inspector.

Rule 6. If, upon inspection, a boiler or unfired pressure vessel is found to be in such condition that it is unsafe to operate, the inspection certificate shall be suspended and the owner or user of such boiler or unfired pressure vessel who causes the same to be operated shall be subject to the penalty as provided in section 9 of Act 174 [ch 97, Acts 49 G.A.; ch 89, C.'50].

Rule 7. Shop inspections made at the request of a boiler manufacturer by the chief inspector or any deputy inspector, shall be charged for at the rate of $10.00 for each boiler plus all expenses to include traveling, hotel and incidentals.

Rule 8. The shell or drum of a boiler or unfired pressure vessel in which a typical "lap seam crack" is discovered along a longitudinal riveted joint for either butt seam or lap joint shall be permanently disconnected for use under steam pressure. By "lap seam crack" is meant the typical crack frequently found in lap seams extending parallel to the longitudinal joint and located either between or adjacent to rivet holes.

Rule 9. All appliances required for electric steam generators shall be attached in accordance with the following rules.

A cable at least as large as one of the incoming power lines to the generator shall be provided for grounding the generator shell. This cable shall be permanently fastened on some part of the generator and shall be grounded in an approved manner.

A suitable screen or guard shall be provided around high tension bushings and a sign posted warning of high voltage. This screen or guard shall be so located that it will be impossible for anyone working around the generator to accidentally come in contact with the high tension circuits. When adjusting safety valves, the power circuits to the generator shall be open. The generator may be under steam pressure but the power line shall be open while the operator is making the necessary adjustments.

Each kw. of electrical energy consumed by an electric steam generator, operating at maximum rating, shall be considered the equivalent of 1 sq. ft. of heating surface of a fire tube boiler when determining the required amount of safety valve capacity.

Rule 10. If a boiler or unfired pressure vessel is jacketed so that the longitudinal seam of shells, drums or domes cannot be seen,

and if it cannot otherwise be determined, enough of the jacketing, setting wall or other covering shall be removed so that the size and pitch of the rivets and such other data as may be necessary to determine the safety of the boiler or unfired pressure vessel or appliance may be determined.

Rule 11. Where a major repair is necessary, a commissioned inspector shall be called for consultation and advice as to the best method of making such repairs; after such repairs are made they shall be subject to the approval of a commissioned inspector. Repairs to all boilers, unfired pressure vessels, and their appurtenances shall conform as nearly as practicable to the requirements of the Iowa Code.

Rule 12. When repairs are to be made wherein fusion welding is to be used, permission must be obtained from the chief inspector, a deputy inspector or a special inspector and the welding must be done in accordance with the rules recommended by the National Board of Boiler and Pressure Vessel Inspectors.

Rule 13. Condemned Boilers. Any boiler or pressure vessel that has been recommended for condemnation shall be immediately discontinued from service. The department shall be promptly notified of such action and the chief inspector or a deputy boiler inspector shall reinspect the boiler for final action. Boilers or pressure vessels that have been condemned shall have distinctly stamped thereon over the state of Iowa Serial number the following symbol, XXX.

Rule 14. An inspection certificate issued in accordance with section 2 (c) of Senate File 174 [ch 97, Acts 49 G.A.; ch 89, C.'50] shall be valid until expiration unless some defect or condition affecting the safety of the boiler or pressure vessel for which it was issued is disclosed.

Rule 15. If a special inspector, upon the first inspection of a new risk, finds that the boiler or pressure vessel or any of the appurtenances are in such condition that his company refuses insurance on same, he shall immediately notify the commissioner of that fact together with a report of the defects.

Rule 16. If upon an external inspection there is evidence of a leak or crack, enough of the covering of the boiler or unfired pressure vessel shall be removed to satisfy the inspector in order that he may determine as to the safety of the boiler or unfired pressure vessel, or if the covering cannot be removed at that time, he may order the operation of the boiler or unfired pressure vessel stopped until such time as the covering can be removed and proper examination made.

Rule 17. In any case where a stationary boiler or unfired pressure vessel is moved

and reinstalled the fittings and appliances must comply with the Iowa Code for New Installations.

Rule 18. Riveted Patches. In applying riveted patches the design of patch and method of installation must be in accordance with the rules for riveted patches recommended by the National Board of Boiler and Pressure Vessel Inspectors.

INSURED BOILERS AND VESSELS

[Filed July 15, 1959]

1. As of July 4, 1959, each certificate shall be issued for a period of one year and shall show an expiration date, and this expiration date shall remain the same as to day and month for this particular boiler or vessel as long as this boiler or vessel remains at the same location or is operated by the same owner or user. New installations are required to have a certificate of inspection issued within thirty days from the date boiler or vessel is put into operation.

2. Internal inspection must be made within a sixty day period immediately prior to the expiration of the certificate.

3. Owner or user of boiler or vessel shall not be issued a notice or statement but must remit the required fee to the Bureau of Labor after inspection has been made and before the expiration date of their valid certificate. Drafts should be made payable to the Bureau of Labor.

4. Upon written request to the Bureau of Labor, showing an emergency exists, owner or user shall be granted a thirty day grace period beyond the expiration date of said certificate and during this grace period said owner or user shall not be considered by the Bureau of Labor to be in violation of Chapter 89, 1958 Code of Iowa.

5. Where owners or users have allowed certificates to become delinquent and boilers have not been in use for a period of ninety days or more, it will be necessary to establish new expiration date to correspond with the date that boiler has been reinspected and put into use.

6. Boilers or vessels inspected by insurance company inspectors that have been previously inspected by the State Boiler Inspector will be issued a certificate as of the date of inspection made by the insurance company.

7. Insurance companies shall notify the Bureau of Labor at the same time they notify owner or user of any cancellation of insurance on any boiler or pressure vessel.

8. When an insurance company insures a boiler or pressure vessel that has been previously insured by another company, the Bureau of Labor must be notified by the present underwriter within thirty days of the date that the company assumes the risk.